TPC-2206/TPC-2212

User Manual

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NATIONAL INSTRUMENTS™

Worldwide Technical Support and Product Information

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This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) as stated in the product specifications. These requirements and limits are designed to provide reasonable protection against harmful interference when the product is operated in its intended operational electromagnetic environment.

This product is intended for use in industrial locations. There is no guarantee that harmful interference will not occur in a particular installation, when the product is connected to a test object, or if the product is used in residential areas. To minimize the potential for the product to cause interference to radio and television reception or to experience unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

Caution To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

Conventions

The following conventions are used in this manual:

»	The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **Options»Settings»General** directs you to pull down the **Options** menu, select the **Settings** item, and select **General** from the last dialog box.
	This icon denotes a note, which alerts you to important information.
	This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash. When this symbol is marked on a product, refer to the *Safety* section of Appendix A, *Specifications*, for information about precautions to take.
	When symbol is marked on a product, it denotes a warning advising you to take precautions to avoid electrical shock.
bold	Bold text denotes items that you must select or click in the software, such as menu items and dialog box options. Bold text also denotes parameter names.
italic	Italic text denotes variables, emphasis, a cross-reference, or an introduction to a key concept. Italic text also denotes text that is a placeholder for a word or value that you must supply.
`monospace`	Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames, and extensions.

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1

General Information

This chapter includes general information about the TPC-2206/TPC-2212 Human Machine Interface (HMI).

Introduction

The TPC-2206/TPC-2212 touch panel computer, an HMI based on an *x*86 platform, includes these key features:

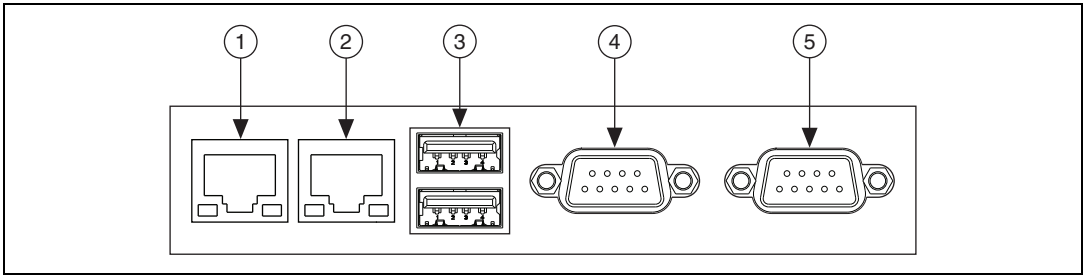
- **Powerful processing**—The TPC-2206/TPC-2212 uses the Intel Atom processor, specifically designed for embedded, industrial applications.
- **Fanless**—By using an advanced but low-power Intel Atom processor, the TPC-2206/2212 does not require a fan for cooling.
- **Robust communication**—The TPC-2206/TPC-2212 is a powerful I/O interface for easy communication with other devices. The I/O interface includes serial ports, gigabit Ethernet, and USB 2.0 support.
- **Wide operating temperature and isolation protection**—The TPC-2206/TPC-2212 provides a –20 to 60 °C operating temperature range and complete isolation protection for the serial ports.
- **Windows Embedded support**—The TPC-2206/TPC-2212 supports the latest embedded Windows operating systems from Microsoft, including Windows XP Embedded (XPe).

I/O Ports

The TPC-2206/TPC-2212 includes the following ports:

- Two serial ports: RS232 (COM1) and RS422/485 (COM2)
- Two USB 2.0 ports compliant with USB 1.0 and 1.1
- Two RJ-45 Gigabit Ethernet ports

Figure 1-1 shows the I/O port arrangement.



1	LAN 1	3	USB	5	COM1 (RS232)
2	LAN 2	4	COM2 (RS422/485)		

Figure 1-1. I/O Port Arrangement

For more TPC-2206/TPC-2212 specifications, refer to Appendix A, *Specifications*.

Cleaning

If you need to clean the unit, use a soft, nonmetallic brush. Make sure that the unit is completely dry and free from contaminants before returning it to service.

2

System Setup

This chapter includes setup information for the TPC-2206/TPC-2212.

Important Safety Information

Before setting up the TPC-2206/TPC-2212, read these safety instructions carefully.

Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.

For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.

Keep this equipment away from excessive humidity.

Place this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.

The openings on the enclosure are for air convection and protect the equipment from overheating. *Do not cover the openings.*

Make sure the power source voltage is correct before connecting the equipment to the power outlet.

Position the power cord so that it cannot be stepped on. Do not place anything over the power cord.

All cautions and warnings on the equipment should be noted.

If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.

Never pour any liquid into an opening. This may cause fire or electrical shock.

Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.

If one of the following situations arises, have service personnel check the equipment:

- The power cord or plug is damaged.
- Liquid has penetrated into the equipment.
- The equipment has been exposed to moisture.
- The equipment does not work well, or you cannot get it to work according to the user manual.
- The equipment has been dropped and damaged.
- The equipment has obvious signs of breakage.

Do not leave this equipment in an environment where the storage temperature may go below –20 °C (–4 °F) or above 60 °C (140 °F). Doing so could damage the equipment. The equipment should be in a controlled environment.

Caution There is a danger of explosion if the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

Caution The protection this equipment provides may be impaired if it is used in a manner not described in this manual.

Setup

Follow these steps to set up the TPC-2206/TPC-2212:

1. Unpack the TPC-2206/TPC-2212. Be sure your kit includes the following items:
   - The TPC-2206/TPC-2212 HMI
   - Six panel mounting clamps (TPC-2206)
   - Six panel mounting screws (TPC-2206)
   - Eight panel mounting clamps (TPC-2212)
   - Eight panel mounting screws (TPC-2212)
   - One 3-pin power connector
   - One HMI Resource CD
   - One earth ground cable

If any items are missing or damaged, contact National Instruments.

Caution Be sure system power is off before plugging in or pulling out the CompactFlash card.

2. Verify that the CompactFlash card containing Windows Embedded or another operating system is installed in the unit.
3. Connect the power connector to an 18–32 VDC power line. Be sure to connect the positive, negative, and ground lines as shown in Figure 2-1. The power lines can be from either a power adapter or in-house power source.

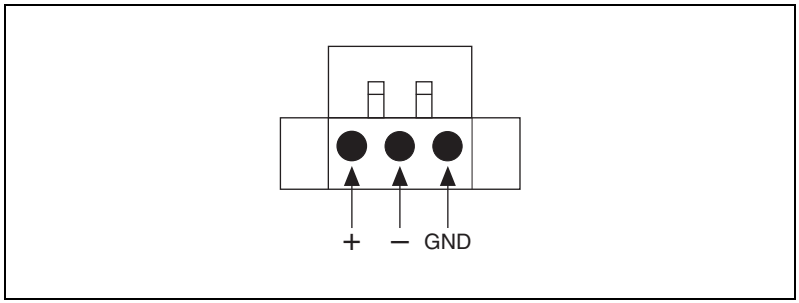


Figure 2-1. Power Connector

4. Connect the power connector to the power receptor on the TPC-2206/TPC-2212. The power receptor pin assignment is shown in Figure 2-2.

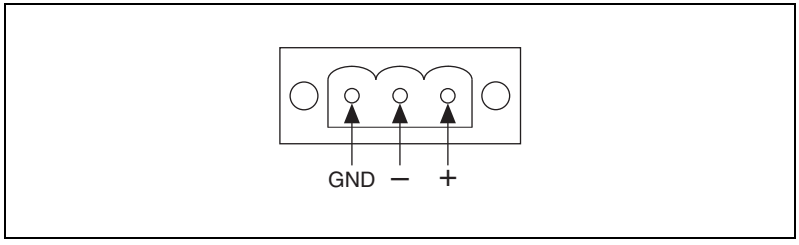


Figure 2-2. Power Receptor and Pin Assignment

5. The system turns on immediately after you apply power.

Touchscreen Calibration

The TPC-2206/TPC-2212 touchscreen should be correctly calibrated and ready to use when you power on the system. However, if the calibration is not correct or you want to choose custom calibration options, refer to Appendix D, *Touchscreen Configuration*.

Panel Mounting

Follow these steps to mount the TPC-2206/TPC-2212 in a panel:

1. Be sure the adhesive waterproof gasket on the front bezel is in position.
2. Install the TPC-2206/TPC-2212 in the panel opening. (Refer to Appendix A, *Specifications*, for cutout dimensions.)
3. Hook the clamps included in the accessory pack to the holes around the four sides of the bezel. Be sure to remove the protective inserts in the panel mounting holes.
4. Insert the screws included in the accessory pack into the clamps. To fasten the TPC-2206/TPC-2212 to the panel, tighten the screws so they push against the mounting panel.

Note The mounting panel thickness should be less than 6 mm (0.236 in.).

3

Jumpers and Connectors

This chapter describes the TPC-2206/TPC-2212 jumpers and connectors.

Jumper and Connector Functions

Table 3-1 lists the jumper and connector functions.

Table 3-1. Mainboard Connectors and Jumpers

Label	Function	Description
BH1	Battery	RTC battery bracket
CN1	LAN2	Gigabit Ethernet: LAN2
CN2	LAN1	Gigabit Ethernet: LAN1
CN3	LCD Power	LCD power connection
CN4	LCD Power	LCD power voltage
CN5	LVDS	LVDS video connection
CN6/CN7	CompactFlash	CompactFlash bracket
CN8	USB2	Two USB type-A female
CN11	COM1	Serial port: COM1 RS232
CN12	COM2	Serial port: COM2 RS422/485
CN13	DC in	DC power in connector (5.08 mm, 3-pin housing)
CN16	CMOS	CMOS clear select
CN17	IDE	AT mode select
CN18	Touchscreen	Touchscreen interface
FS1	Fuse	Fuse bracket
SODIMM1	RAM	DDR2 SODIMM bracket

Table 3-1. Mainboard Connectors and Jumpers (Continued)

Label	Function	Description
SW1	LCD Resolution	LCD resolution select
SW2	LCD Function	LCD controlled function
SW3	Touchscreen	Touchscreen type
SW4	Termination	Serial termination resistor
U2	CPU	CPU
U4	SCH	System controller hub
U12	BIOS	BIOS chip

Jumper and Connector Locations

Figures 3-1 and 3-2 show the jumper and connector locations.

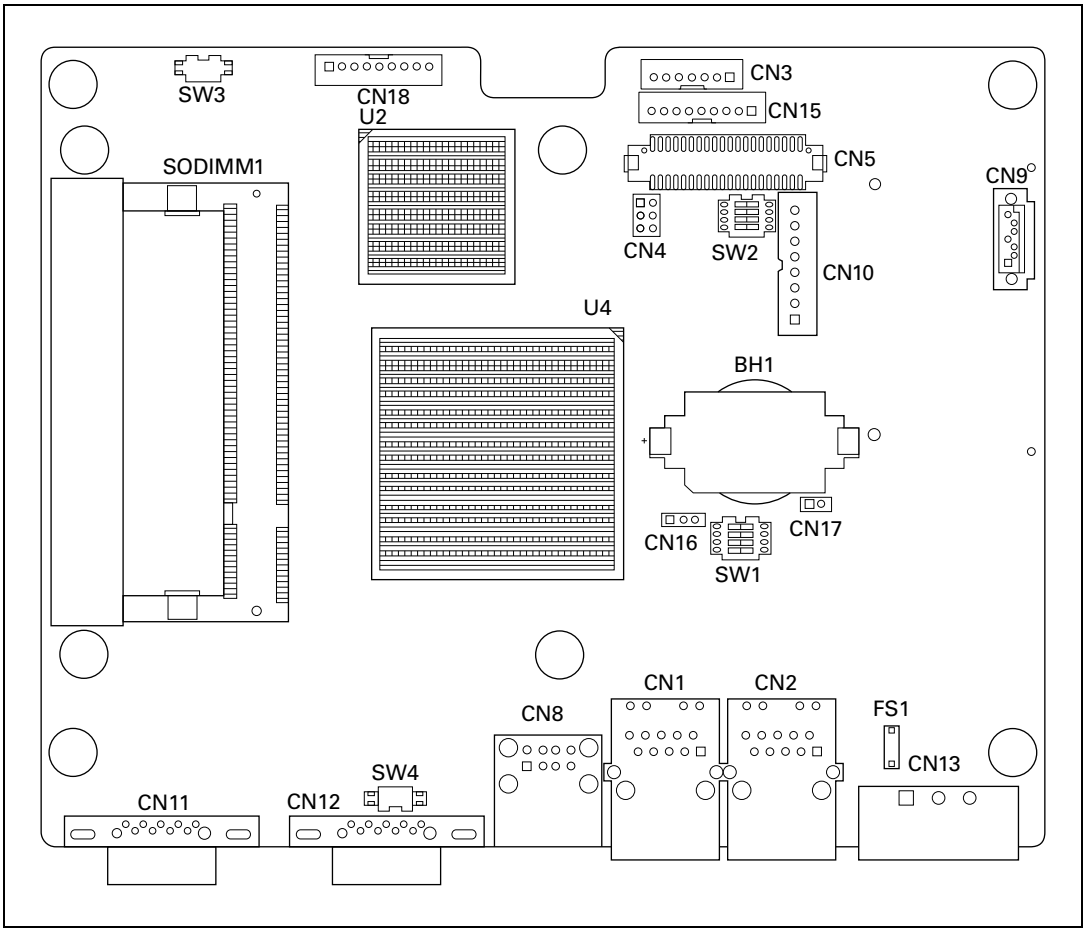


Figure 3-1. Main Board Jumpers and Connectors—Top Side

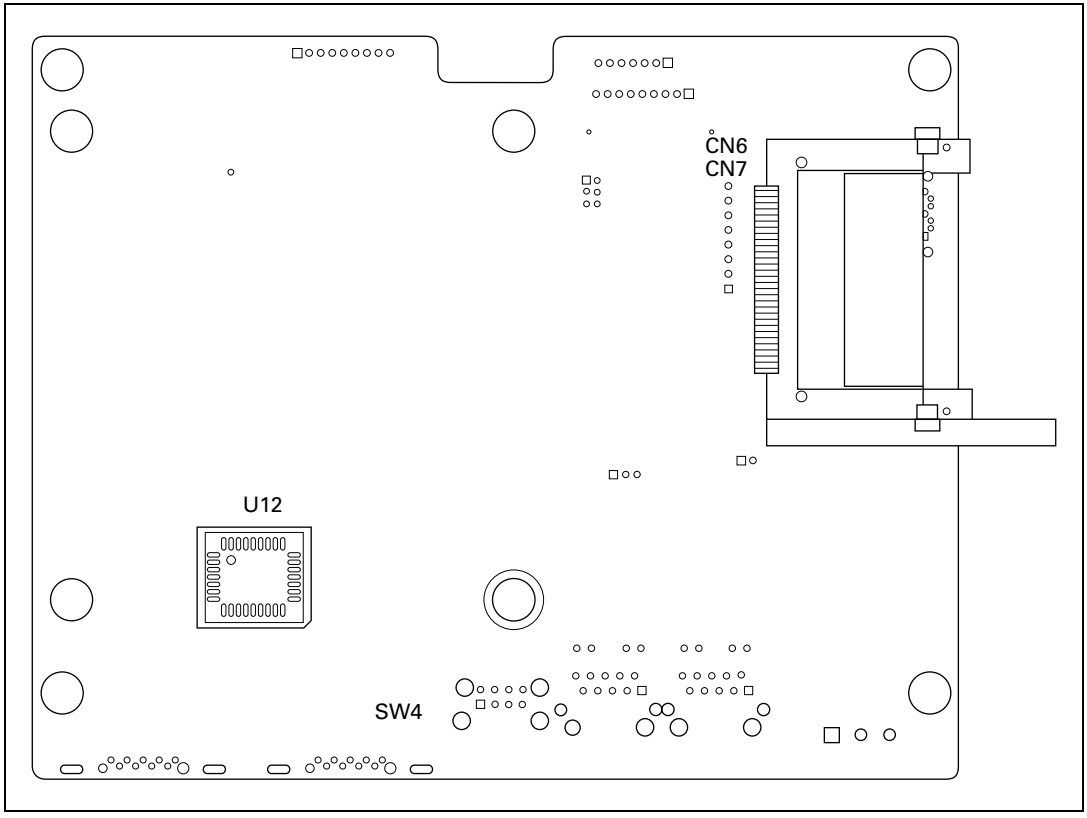


Figure 3-2. Main Board Jumpers and Connectors—Bottom Side

A

Specifications

This appendix lists the TPC-2012/TPC-2512 system specifications.

Physical

TPC-2206

Weight ..... 1.43 kg

Dimensions (W × H × D) ..... 195 × 148 × 58 mm
(7.68 × 5.83 × 2.28 in.)

Cutout dimensions ..... 189.1 × 142.1 mm (suggested)
(7.44 × 5.59 in.)

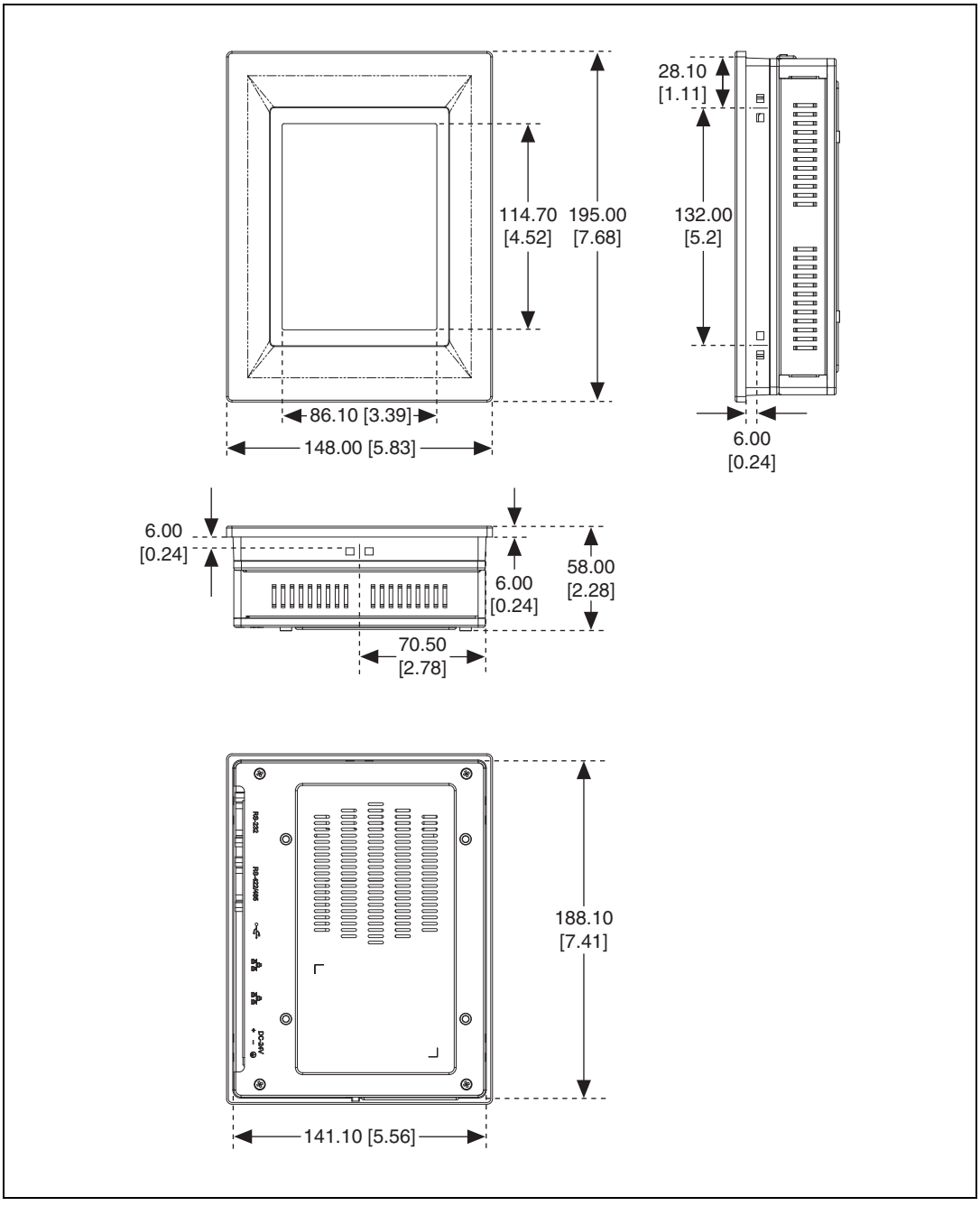
TPC-2212

Weight ..... 2.5 kg

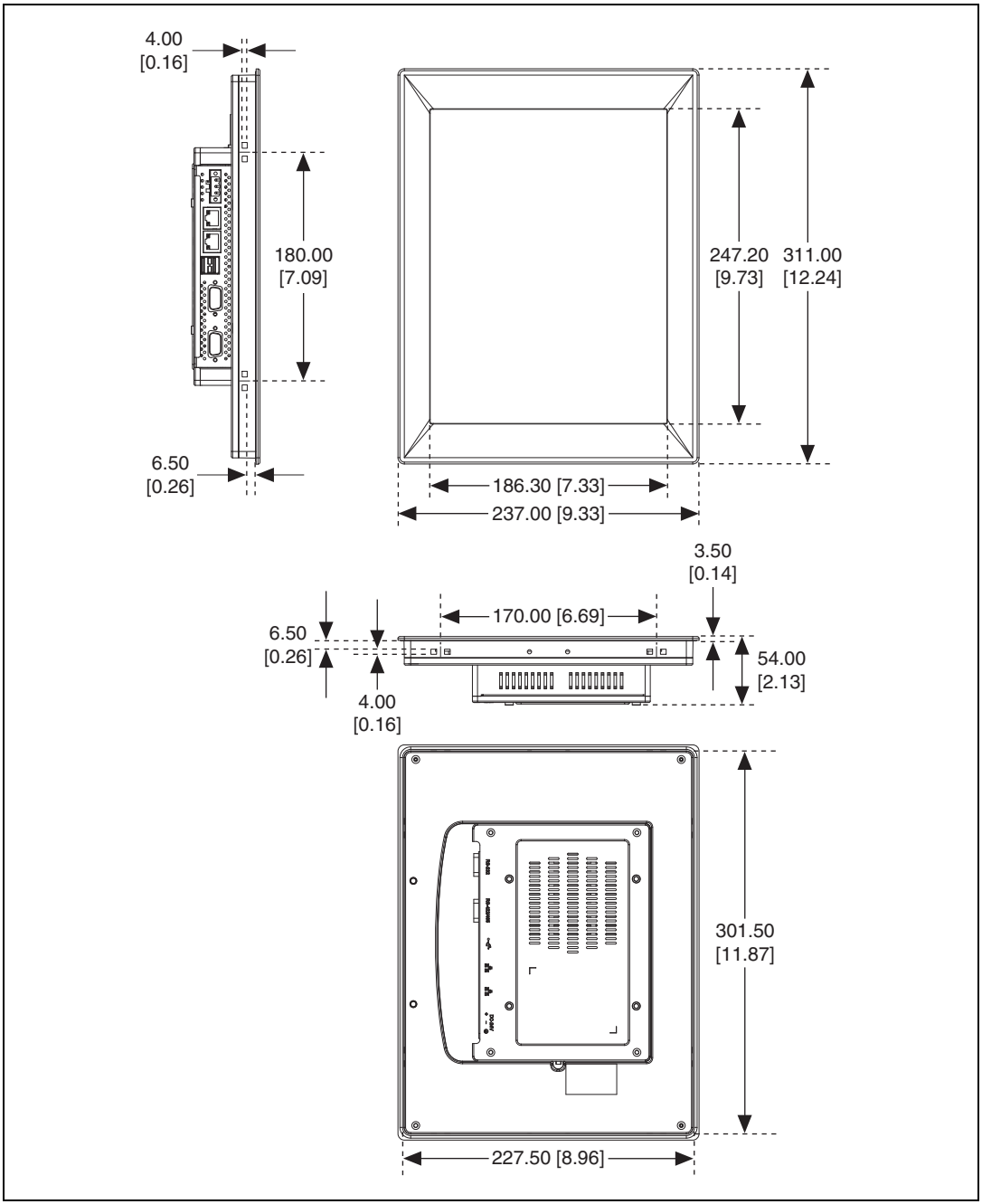
Dimensions (W × H × D) ..... 311 × 237 × 54 mm
(12.24 × 9.33 × 2.13 in.)

Cutout dimensions ..... 302.5 × 228.5 mm (suggested)
(11.91 × 9.00 in.)

Dimensions (TPC-2206)



Dimensions (TPC-2212)



System

CPU .....Intel Atom Processor Z520PT
1.33 GHz w/HyperThreading

SCH .....Intel System Controller Hub
US15WPT

Video .....Intel GMA 500

BIOS .....Award 4 Mbit flash

Ethernet.....Realtek RTL8168C(P) × 2;
10/100/1000, IEEE 802.3ab
protocol compatible

RAM .....1 GB DDR2

Watchdog timer .....SCH3114X1watchdog timer;
1 to 255 s timeout period

CompactFlash .....Ultra ATA/100, UDMA/100
compatible, 4 GB minimum

LCD

Display type.....TFT LCD

Size (diagonal).....5.7 in. (TPC-2206)
12.1 in. (TPC-2212)

Maximum resolution.....640 × 480 VGA (TPC-2206)
800 × 600 SVGA (TPC-2212)

Maximum colors.....262,000

Viewing angle.....160°/140°

Luminance (cd/m²) 700 (TPC-2206)
450 (TPC-2212)

Contrast ratio 800:1 (TPC-2206)
700:1 (TPC-2212)

Operating temperature .....–30 to 85 °C (–22 to 185 °F)
(ambient, LCD Only)

Backlight ..... LED

Backlight lifespan ..... 50,000 h

Note There may be several bright or dark pixels on the LCD. This phenomenon is normal in LCD manufacturing.

Touchscreen

Touch type..... Resistive 4-wire (TPC-2206)
Resistive 5-wire (TPC-2212)

Base glass construction ..... Tempered glass

Resolution ..... 1024 × 1024

Light Transmission ..... 80% ± 3%

Controller ..... RS-232 interface (COM3)

Lifespan..... 1 million touches at a single point

Power

Input voltage ..... 18 to 32 VDC

Typical ..... 24 VDC @ 0.93 A

Note Providing power levels either below or above the stated range is not recommended.

Fuse

Rating ..... T3.15 A, 250 V

Size..... 5 × 20 mm

Note When replacing the fuse, use only a fuse of the same type and rating.

Note For your protection, the fuse is set to break if the input voltage exceeds 33 VDC.

Environment

Operating temperature..... –20 to 60 °C (–4 to 140 °F)

Storage temperature ..... –20 to 60 °C (–4 to 140 °F)

Humidity .....40 °C @ 10 to 95% relative humidity (noncondensing)

Vibration .....2 grms (5 to 500 Hz)

Maximum altitude.....2,000 m

Pollution Degree 2

Indoor use only

Note The front bezel is compliant with NEMA4 and IP65.

Safety

This product is designed to meet the requirements of the following standards of safety for information technology equipment:

- IEC 60950-1, EN 60950-1
- UL 60950-1, CSA 60950-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for information technology equipment:

- EN 55024 (CISPR 24); Immunity
- EN 55022 (CISPR 22); Class A Emissions
- EN 55011 (CISPR 11); Class A Emissions
- AS/NZS CISPR 11; Class A Emissions
- AS/NZS CISPR 22; Class A Emissions
- FCC 47 CFR Part 15B: Class A Emissions
- ICES-003: Class A Emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

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Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

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(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

Mercury Disposal and Recycling

LCD lamp(s) in this monitor contain mercury. Dispose or recycle according to local, state or federal laws. Consult the Electronic Industries Alliance at `www.eiae.org` for more information. For specific information on lamp disposal, consult `www.lamprecycle.org`.

Cleaning

If you need to clean the unit, use a soft, nonmetallic brush. Make sure that the unit is completely dry and free from contaminants before returning it to service.

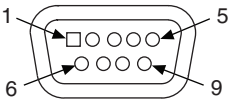
B

Serial Port Settings

This appendix describes the TPC-2206/TPC-2212 serial port settings.

COM1 Connector Pinout

The TPC-2206/TPC-2212 COM1 serial port is RS232 only. The following figure and table show the COM1 connector pinout.



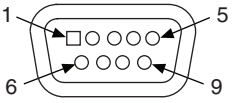
Pin	Signal
1	NDCD
2	NRX
3	NTX
4	NDTR
5	GND
6	NDSR
7	NRTS
8	NCTS
9	NRI

COM2 Connector Pinout

The TPC-2206/TPC-2212 COM2 serial port is adjustable. You can set it to RS422 or RS485, and it has auto data flow control capability. In other words, the TPC-2206/TPC-2212 can automatically detect the data flow direction at this port when two-wired RS485 communication is activated.

You must configure the TPC-2206/TPC-2212 COM ports in the BIOS.

The following figure and table show the COM2 pinout and settings.



PIN	RS-422	RS-485
1	TX–	D–
2	TX+	D+
3	RX+	—
4	RX–	—
5	GND	GND

COM2 Port Mode

You must configure the TPC-2206/TPC-2212 COM2 mode in the BIOS. Before performing the following steps, connect a USB keyboard to the TPC-2206/TPC-2212.

1. Power on the TPC-2206/2212.
2. While the unit is booting, but prior to the Windows splash screen, press <Del> to enter the BIOS setup.
3. In the BIOS, select **Integrated Peripherals**.
4. Under **Serial Port 2 Mode**, select either **RS-422** or **RS-485**.

C

Features in Windows XP Embedded

The TPC-2206/TPC-2212 supports the Windows XP Embedded platform (commonly abbreviated XPe), which is a componentized version of the Windows XP Professional edition.

EWF and FBWF

Enhanced Write Filter (EWF) provides an upper filter in the storage device driver stack that redirects disk write operations to volatile (RAM) or nonvolatile (disk) storage. EWF protects a volume from write access and offers the following benefits:

- Write-protects one or more partitions on your system.
- Enables read-only media, such as CD-ROM or flash, to boot and run.
- Prolongs the lifespan of write-sensitive storage, such as CompactFlash.

File Based Write Filter (FBWF) also redirects disk write operations to volatile (RAM) or nonvolatile (disk) storage. Where EWF protects entire volumes from writes, FBWF protects only individual files and directories. Although FBWF is not as robust as EWF, because EWF protects entire volumes, it is very useful when you need to write to specific files and have those changes persist between reboots.

You can enable and disable EWF and FBWF only between reboots.

To disable/enable EWF/FBWF, go to **Start»All Programs»Utilities** and select the EWF tab. The default setting is disabled for both.

When EWF is enabled, the `C:` partition is protected from any disk writing. In this mode, any changes on the C: partition (including modifications to files or the registry) are redirected to memory. Thus, these changes are discarded in the next system startup. You can enable this mode manually after finishing all system changes such as installing your applications or adjusting system settings.

HORM

Hibernate Once, Resume Many (HORM) enables users to create a single hibernation file and boot to that file repeatedly. Using HORM, you can boot to a known state each time the system is powered on. HORM works only when EWF is enabled on all system partitions. HORM does not work with FBWF. Depending on the system state, HORM can reduce boot times.

To enable HORM, you first must enable EWF as described in the *EWF and FBWF* section. Once enabled, return to the EWF utility at **Start»All Programs»Utilities»EWF**. Select the **HORM** tab and select **HORM**. This hibernates the system and creates the hibernation file. After you perform this step, all subsequent reboots resume from that hibernation file.

Note You can programmatically control EWF, FBWF, and HORM using VIs included with the LabVIEW 2010 or later Touch Panel Module.

Drivers

The TPC-2206/TPC-2212 is configured with all necessary drivers installed. If you need to reinstall any drivers, they are on the HMI Resources CD, which is included in the kit. They are also on the TPC-2206/TPC-2212 under `C:\DriverInstall`.

D

Touchscreen Configuration

This appendix explains how to configure the TPC-2206/TPC-2212 touchscreen using the PenMount Control Panel.

To calibrate the TPC-2206/TPC-2212, go to **Start»All Programs» PenMount Windows Universal Driver»Utility»PenMount Control Panel**. Select **PenMount 6000 RS232** under **Select a device to configure** and click **Configure**. Here you can select either **Standard Calibration** or **Advanced Calibration**. Follow the onscreen instructions for either choice.

E

Technical Support and Professional Services

Visit the following sections of the award-winning National Instruments Web site at ni.com for technical support and professional services:

- **Support**—Technical support at ni.com/support includes the following resources:
  - **Self-Help Technical Resources**—For answers and solutions, visit ni.com/support for software drivers and updates, a searchable KnowledgeBase, product manuals, step-by-step troubleshooting wizards, thousands of example programs, tutorials, application notes, instrument drivers, and so on. Registered users also receive access to the NI Discussion Forums at ni.com/forums. NI Applications Engineers make sure every question submitted online receives an answer.
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